traffic.com
A NAVTEQ Company

Collecting Data: Technologies and Partnerships

California 511

October 28, 2008

NAVTEQ

Collecting Data: Overview

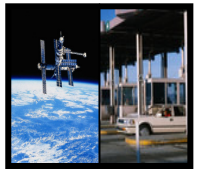
- Technologies
  - Gather from different sources
  - Process and improve data quality
- Partnerships
  - Connected Traveler (CCIT/Caltrans)
  - Los Angeles/Inland Empire (District 8)
  - Sacramento (District 3)
  - San Diego (SANDAG/ District 11)
  - San Jose (District 4)
  - San Francisco (District 4)
- Delivery of Data Services
  - Real time
  - Archived

NAVTEQ

Technology Leadership: End-to-End Solution

Traffic.com Sensor Network

Agency Sensor / Flow Data



Probe Data - Cell, GPS and GPS Cell

Historic Data

Incident and Event Data

TIMS

Television

511 Services

Radio

Internet

Wireless

In-Vehicle

Data Management Software

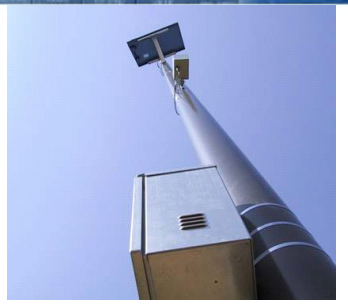
Collection → Processing → Delivery

NAVTEQ

Collection - Sources

Comprehensive Traffic Flow Data Solution

- NAVTEQ's Sensor Network
  - Owns and operates over 2,500 center lane miles of sensors providing volume, speed, classification and density
- Agency Data
  - Agency data is processed through the TIMS engine to clean the data.
- Probes (Cell and GPS)
  - Extends the sensor network with coverage and accuracy. Tens of millions of GPS data points/day.
- NAVTEQ Operations Centers- Three in California
- Historic Data
  - Augments real-time traffic data with a nationwide historic traffic model covering 900,000 miles



Traffic.com sensor

NAVTEQ

Collection

NAVTEQ Sensors

- Lane-by-lane data
- Data collected every 60 seconds
- Lane by lane average speed, volume, lane occupancy, & vehicle classification
- Up to four vehicle classifications
  - Non-commercial
  - Single-unit commercial
  - Single-trailer commercial
  - Multi-trailer commercial
- Technology
  - Solar Powered
  - Wireless Communications
  - Modular Components
  - Non-Intrusive
  - Covers All Lanes
  - High Reliability

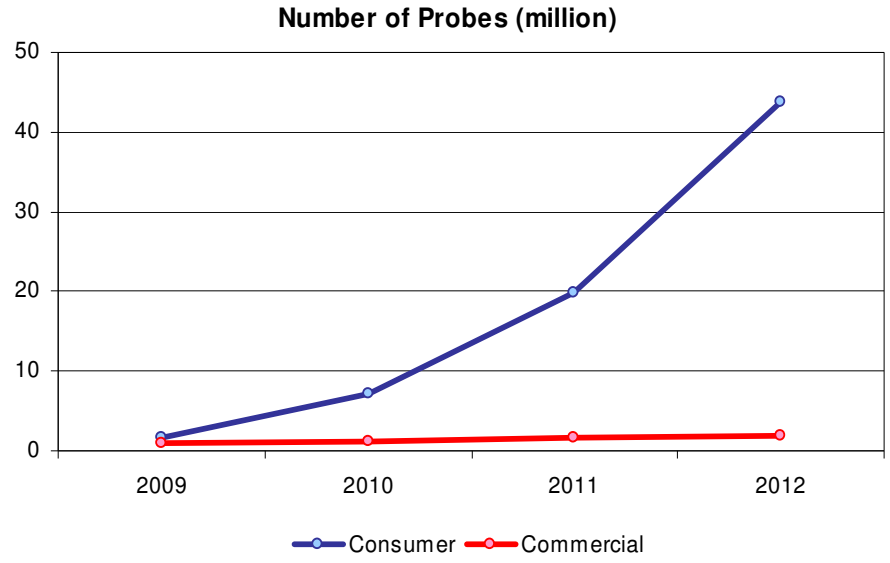
NAVTEQ Sensor

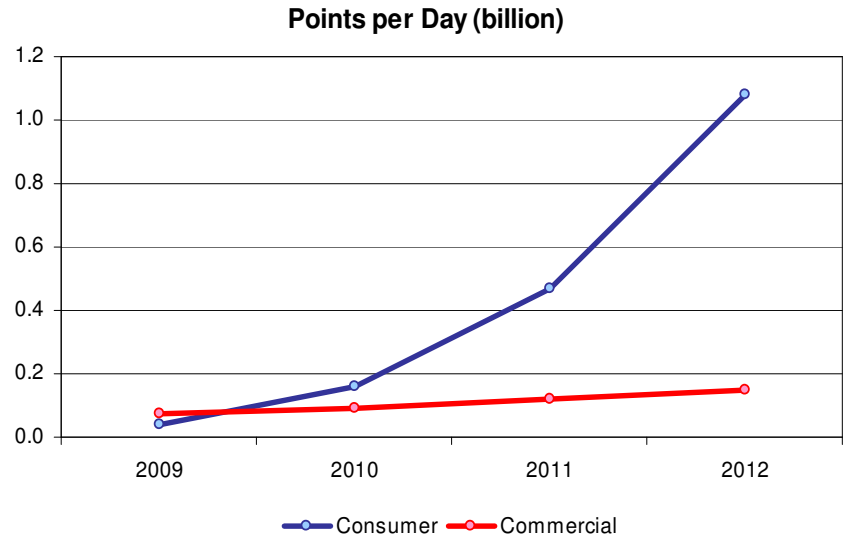
TIMS

NAVTEQ

Collection

GPS Data





NAVTEQ is uniquely positioned to source consumer probe data

- Supplier to wireless carriers, and car and device manufacturers
- Nokia relationship
- Map and traffic products

Collection

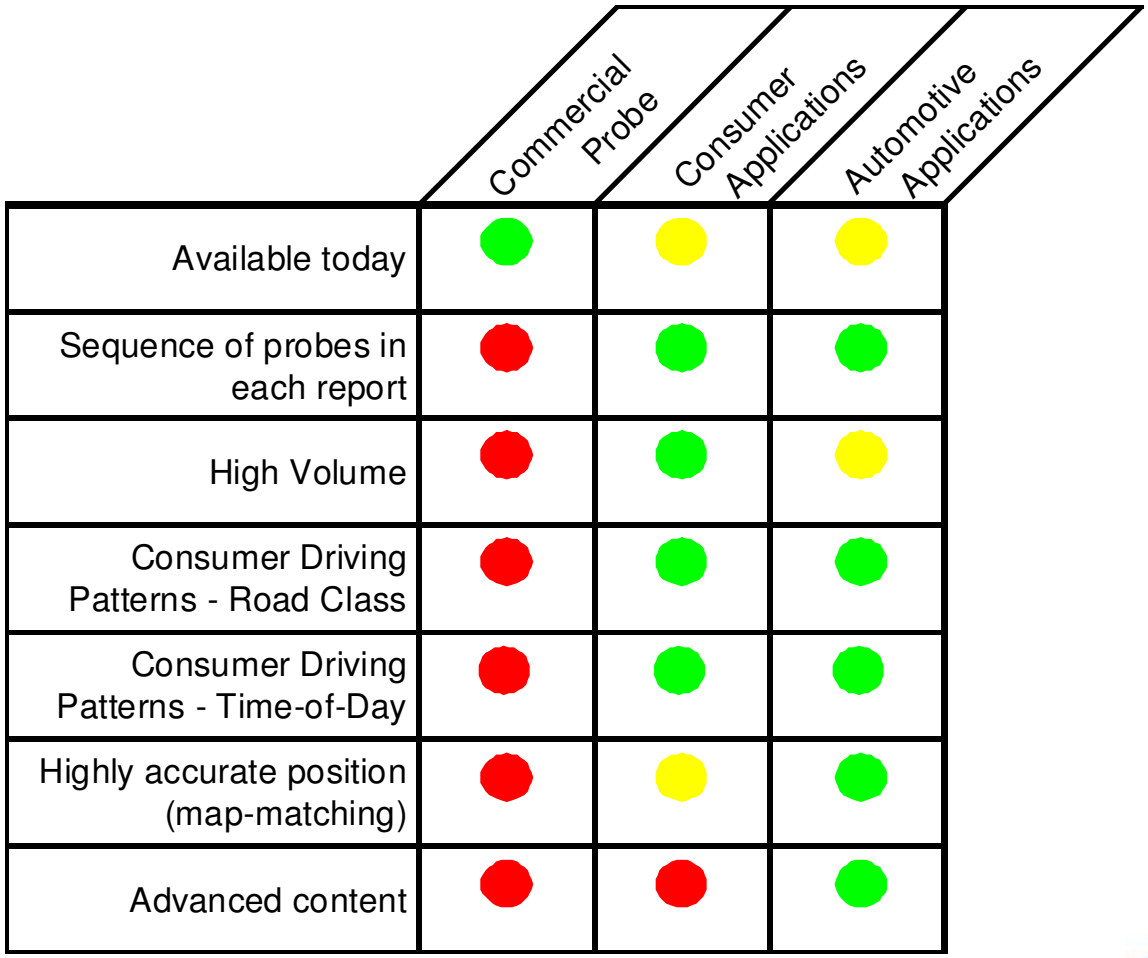
Nokia Phones

- Two coordinated programs
  - Contract with US Department of Transportation, Caltrans, and Univ. of California
    - Advanced technology development
    - Special focus on ensuring privacy
  - Commercial deployment
    - Alpha and beta tests in Q4 2008
    - Commercial launch in Q1 2009

Collection

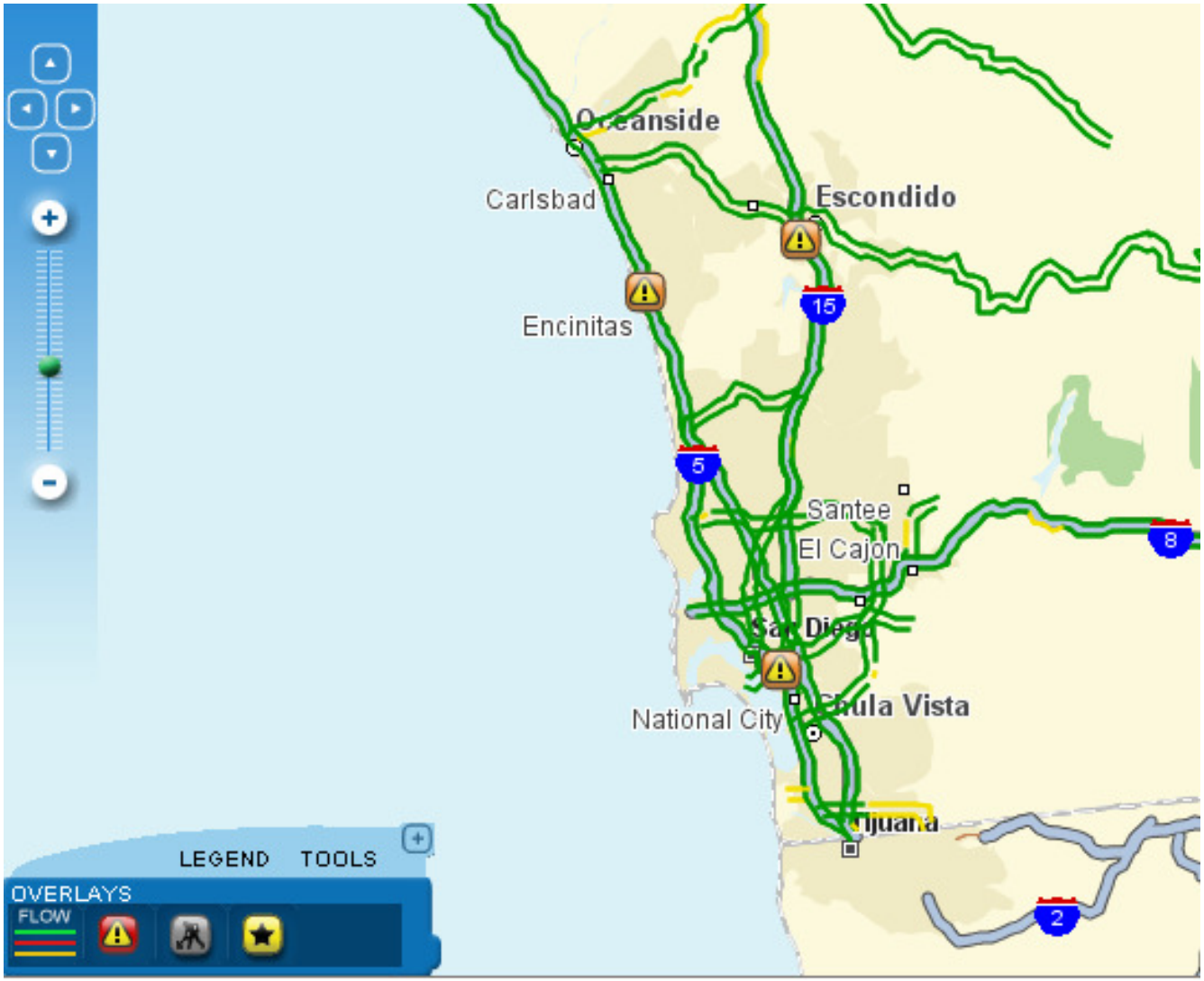
Comparison of GPS Probe Data

Not all probes are created equal



NAVTEQ

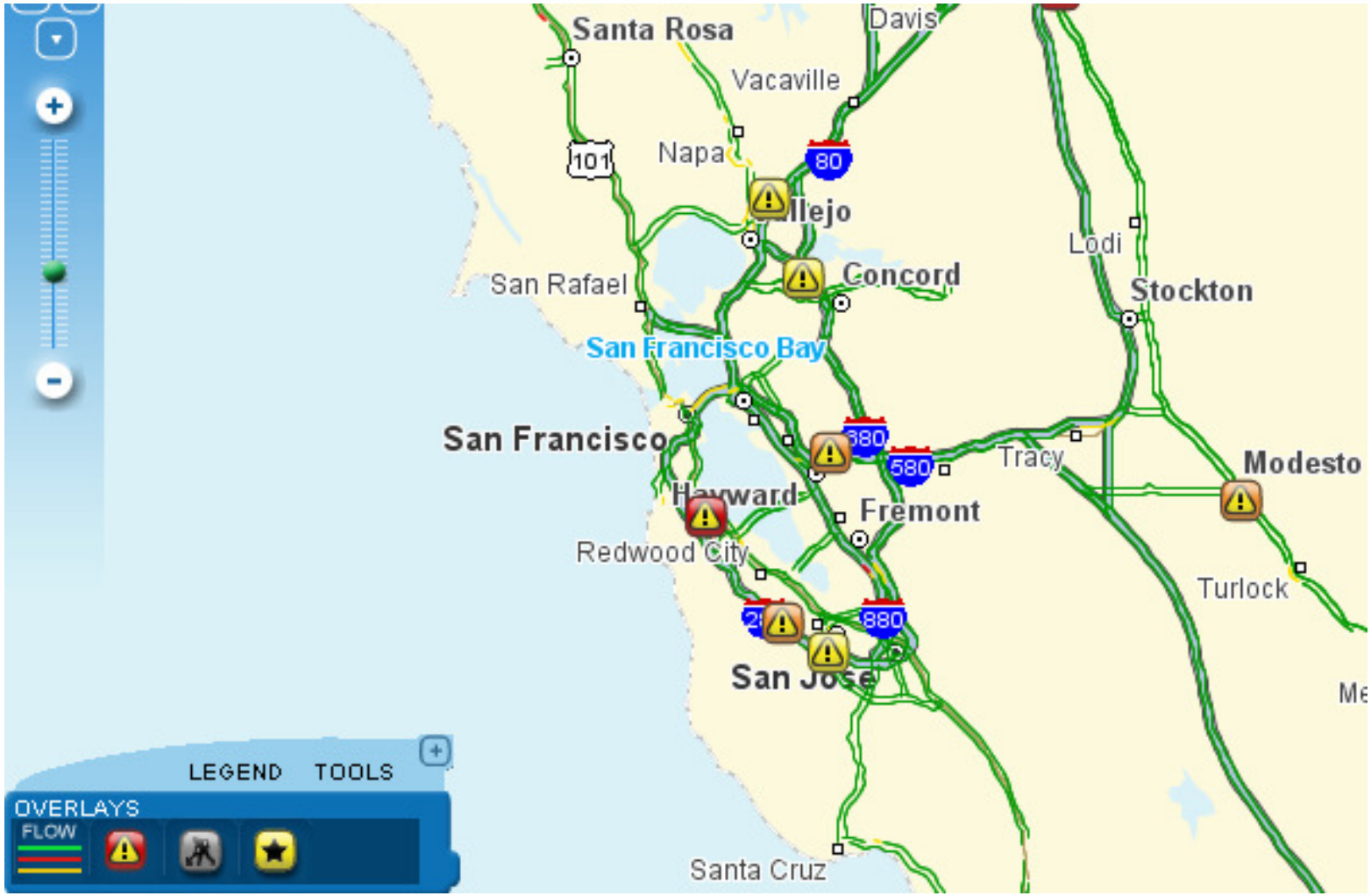
San Diego Area Traffic Map



NAVTEQ

Los Angeles Area Traffic Map

San Francisco Area Traffic Map



NAVTEQ

Sacramento Area Traffic Map

NAVTEQ

Processing: HTTM (Hierarchical Travel Time Model)

- Incorporate all data sources
  - Fixed Sensors
  - Probe (fleet and GPS cell)
  - Probe Sequences (previous probe combined with current probe)
  - Incident Data
  - Historical Data
- Optimizes calculation cycles
  - Data feed synchronization
- Weighs data sources on a continuous basis
  - Distance decay
  - Time decay
- Confidence calculation

NAVTEQ

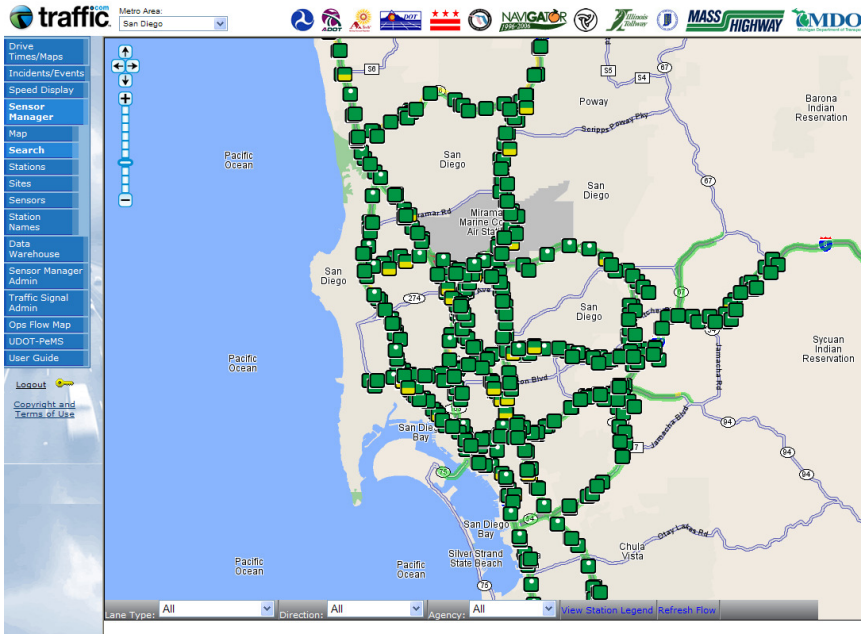
Delivery

Sensor Manager

Operations and Traffic Management

Stakeholder access to real-time, digital sensor data

- Region-wide Map
- Individual Sensor Access
- Lane-by-lane Data
- Speed, Volume and Lane Occupancy



Station CA015006[15196]. I-15 - 0.81 Mile North of Market Street - Milepost 2.7

Live Update | Update Data Now | Go To Info Page (close this window) | Close this window

Time	Int	Ln #	Direction	Lane Pos	Lane Type	Speed	Volume	Occupancy	Class1	Class2	Class3	Class4	Sensor	Device	Stat
1:31:30 PM	60	1	North	RIGHT	THRU	61	16	2.4%	16	0	0	0	64929	1	A
1:31:30 PM	60	1	North	CENTER	THRU	65	22	5.2%	21	1	0	0	64929	2	A
1:31:30 PM	60	1	North	LEFT	THRU	67	14	2.4%	14	0	0	0	64929	3	A
1:31:30 PM	60	1	South	RIGHT	THRU	60	8	1.6%	8	0	0	0	64929	4	A
1:31:30 PM	60	1	South	CENTER	THRU	55	11	2.0%	11	0	0	0	64929	5	A
1:31:30 PM	60	1	South	LEFT	THRU	65	4	0.6%	4	0	0	0	64929	6	A

NAVTEQ

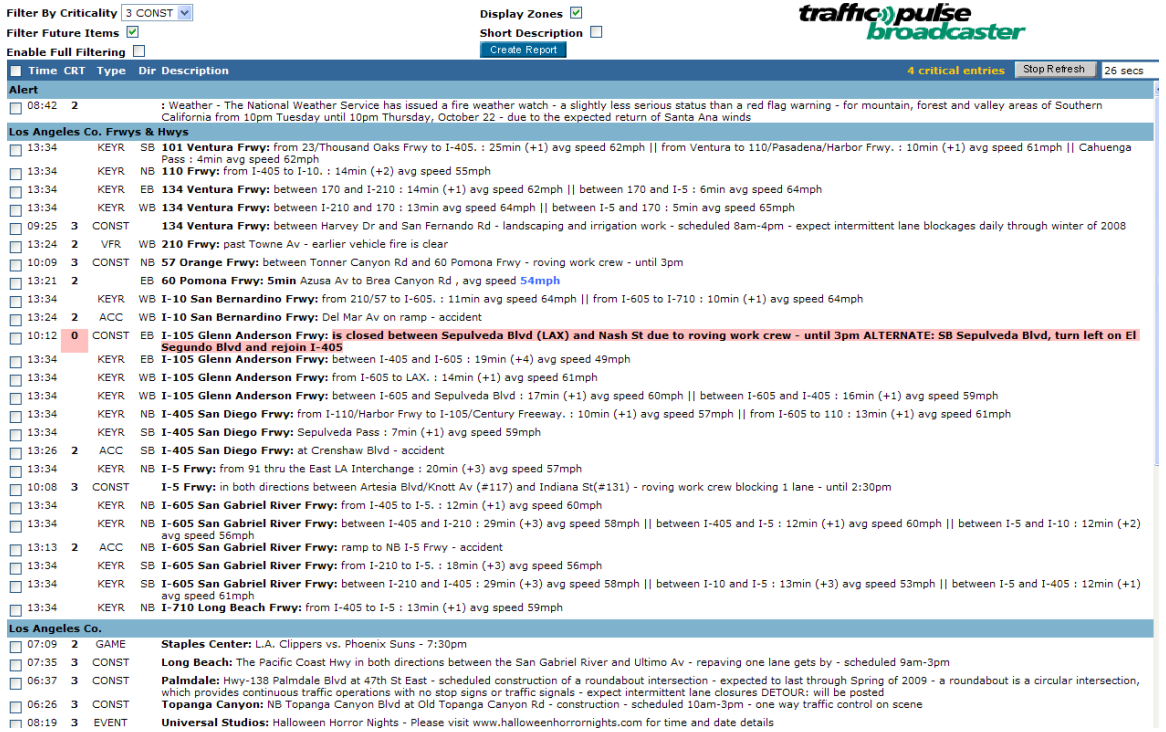
Delivery

Incident and Event Monitor

Operations and Traffic Management

Stakeholder/Broadcasters access to incidents and events

- Web-based tool
- Incidents and events
- Archived



NAVTEQ

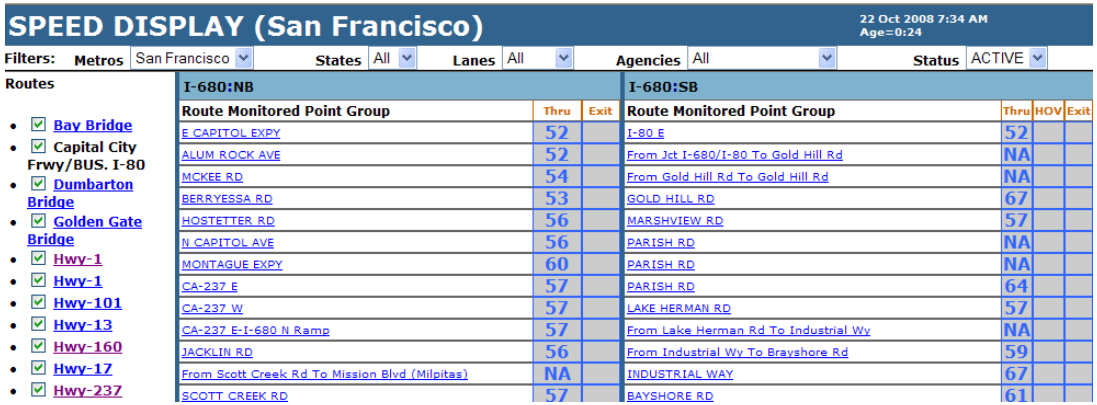
Delivery

Sensor Speed Display

Operations and Traffic Management

Agency access to real-time speed data by roadway and direction

- Speed data
- Aggregated by direction and lane type
- View of individual lanes
- Ability to see speeds below user selected threshold



SPEED DISPLAY (San Francisco) — 22 Oct 2008 7:34 AM, Age=0:24

Filters: Metros: San Francisco | States: All | Lanes: All | Agencies: All | Status: ACTIVE

Routes

- Bay Bridge
- Capital City Frwy/BUS. I-80
- Dumbarton Bridge
- Golden Gate Bridge
- Hwy-1
- Hwy-1
- Hwy-101
- Hwy-13
- Hwy-160
- Hwy-17
- Hwy-237

I-680:NB			I-680:SB			
Route Monitored Point Group	Thru	Exit	Route Monitored Point Group	Thru	HOV	Exit
E CAPITOL EXPY	52		I-80 E	52		
ALUM ROCK AVE	52		From Jct I-680/I-80 To Gold Hill Rd	NA		
MCKEE RD	54		From Gold Hill Rd To Gold Hill Rd	NA		
BERRYESSA RD	53		GOLD HILL RD	67		
HOSTETTER RD	56		MARSHVIEW RD	57		
N CAPITOL AVE	56		PARISH RD	NA		
MONTAGUE EXPY	60		PARISH RD	NA		
CA-237 E	57		PARISH RD	64		
CA-237 W	57		LAKE HERMAN RD	57		
CA-237 E-I-680 N Ramp	57		From Lake Herman Rd To Industrial Wy	NA		
JACKLIN RD	56		From Industrial Wy To Brayshore Rd	59		
From Scott Creek Rd To Mission Blvd (Milpitas)	NA		INDUSTRIAL WAY	67		
SCOTT CREEK RD	57		BAYSHORE RD	61		

NAVTEQ

Agency Planning and Operations

Planning and Operations

Agency access to archived sensor and incident traffic data

- Raw Data
  - 1 min. data by lane
- Historical data
- Incidents & events
- Reports
- Select Station
- Date Range
  - Start Date
  - End Date
- Aggregate Time
  - 24 hour
  - 1 hour
  - 15 minute
  - 5 minute
- Format
  - HTML
  - Excel

Aggregated Station Data 280840 - 0.153 Miles South of Washington St - 15208 [New Selection]

Day	Date	Time	Interval (min)	Direction	# of Lanes	Avg Spd (mph)	Total Vol	Occ	Class 1	Class 2	Class 3	Class 4	Total Readings (Volume)	Valid Readings (Volume)
WED	10/01/2008	00:00:00	60	N	6	72.69	750	0.58	720	17	6	7	360	360
WED	10/01/2008	00:00:00	60	S	6	67.69	957	1.25	710	242	1	4	360	360
WED	10/01/2008	01:00:00	60	N	6	65.93	434	0.35	419	7	3	5	360	360
WED	10/01/2008	01:00:00	60	S	6	66.38	567	0.75	396	165	2	4	360	360
WED	10/01/2008	02:00:00	60	N	6	67.72	309	0.25	298	3	4	4	360	360
WED	10/01/2008	02:00:00	60	S	6	66.71	449	0.6	315	128	0	6	360	360
WED	10/01/2008	03:00:00	60	N	6	66.58	273	0.22	260	6	4	3	360	360
WED	10/01/2008	03:00:00	60	S	6	66.4	357	0.5	235	109	9	4	360	360
WED	10/01/2008	04:00:00	60	N	6	64.14	544	0.45	526	12	3	3	360	360
WED	10/01/2008	04:00:00	60	S	6	67.06	632	0.9	403	212	7	10	360	360
WED	10/01/2008	05:00:00	60	N	6	66.44	1562	1.34	1503	42	13	4	360	360
WED	10/01/2008	05:00:00	60	S	6	66.85	1548	2.17	1069	454	14	11	360	360
WED	10/01/2008	06:00:00	60	N	6	67.6	3924	3.33	3813	82	23	6	360	360
WED	10/01/2008	06:00:00	60	S	6	68.21	3572	4.89	2603	940	20	9	360	360
WED	10/01/2008	07:00:00	60	N	6	67.38	7087	5.86	6904	144	29	10	360	360
WED	10/01/2008	07:00:00	60	S	6	68.46	6954	9.28	5445	1454	42	13	360	360
WED	10/01/2008	08:00:00	60	N	6	68.82	6301	5.13	6149	118	24	10	360	360
WED	10/01/2008	08:00:00	60	S	6	49.34	7414	19.38	4084	3076	216	38	360	360
WED	10/01/2008	09:00:00	60	N	6	65.98	5032	4.28	4861	139	27	5	360	360
WED	10/01/2008	09:00:00	60	S	6	69.52	5772	7.77	4311	1402	41	18	360	360
WED	10/01/2008	10:00:00	60	N	6	66.03	4390	3.74	4244	113	29	4	360	360
WED	10/01/2008	10:00:00	60	S	6	70.06	4620	6.36	3229	1334	39	18	360	360
WED	10/01/2008	11:00:00	60	N	6	68.29	4176	3.48	4045	103	22	6	360	360
WED	10/01/2008	11:00:00	60	S	6	69.49	4853	6.69	3336	1450	54	13	360	360
WED	10/01/2008	12:00:00	60	N	6	68.92	4159	3.4	4044	84	30	1	360	360
WED	10/01/2008	12:00:00	60	S	6	69.5	4409	7.16	3063	1283	48	15	306	306
WED	10/01/2008	13:00:00	60	N	6	69.44	4504	3.66	4375	104	22	3	360	360
WED	10/01/2008	13:00:00	60	S	6	69.28	4954	6.84	3342	1553	47	12	360	360
WED	10/01/2008	14:00:00	60	N	6	67.89	4936	4.17	4810	90	31	5	354	354

Station

Station ID: 15208 - 280840

OR

Station Description: --NOT SELECTED--

Date

Start Date: 10 / 1 / 2008

End Date: 10 / 5 / 2008

Output

Aggregate Time: 1 Hr

Format: HTML

[Get Aggregated Data]

NAVTEQ

Delivery

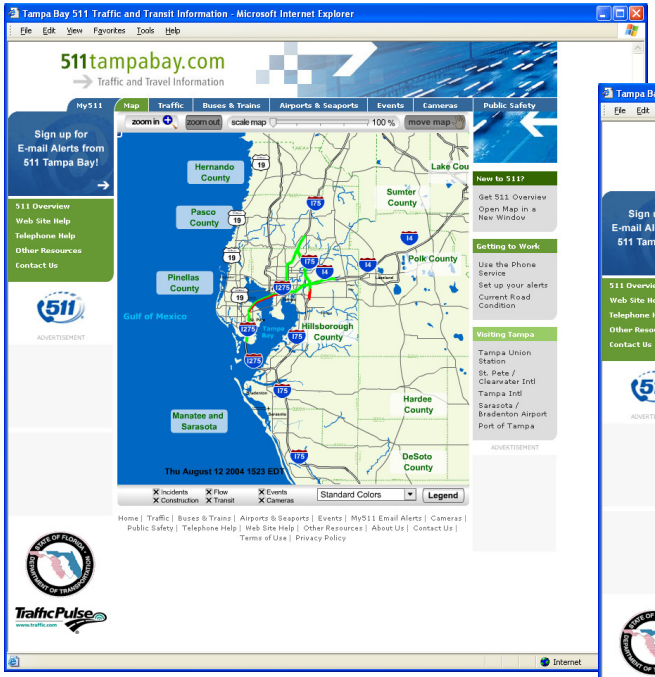
Stakeholder: Archived Data - Reports

- Daily Agency and NAVTEQ Sensor Data Reports
  - 5-minute reports by lane
  - 15-minute reports aggregated by direction
  - 1-hour reports aggregated by direction
  - Data quality reports
- Monthly Agency and NAVTEQ Sensor Data Reports
  - Traffic Monitoring Reports (HPMS Format)
  - Performance Measure Reports
- Station Reports
  - Agency and NAVTEQ Station information in a single file

Delivery

Tampa Bay 511 Example

Home Page



Flow Maps

Email Alerts

NAVTEQ

How NAVTEQ Can Help

- **511 Services: Free or Customized**
  - Interactive voice system
  - Web Site
  - Personalized routes and alerts
- **Traffic Data Services**
  - Expand Sensor coverage
  - Expand Agency data and/or fill gaps
  - Operate and maintain system
- **Data Management Systems**
  - Real-time monitoring systems
  - Archive database
  - Data quality tools
- **License Incident and Probe Data**
  - Support operations
  - Traveler information
  - 511 Services

NAVTEQ

NAVTEQ Fast Facts

- NAVTEQ creates digital maps and map content that power navigation and location-based services solutions around the world.
- Traffic.com is owned by NAVTEQ, which gives us access to worldwide resources.
- NAVTEQ/Traffic.com is the only provider of one stop, end-to-end traffic solutions to customers and commuters.
- NAVTEQ is the largest provider of in-vehicle mapping/traffic to automotive manufacturers.
- NAVTEQ was founded in 1985 and has approximately 3,400 employees located in 144 offices and in 28 countries.
- Nokia's acquisition of NAVTEQ/Traffic.com gives us the ability to leverage cell phone technology for traffic information.
- Nokia is the world's largest cell phone manufacturer.

traffic.com
A NAVTEQ Company

NAVTEQ

A NAVTEQ/NOKIA Company
Successful Public Data Services

www.traffic.com

NAVTEQ